



Electric and magnetic field turbulent spectra in space plasmas: in situ observations and kinetic simulations

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Measuring properties of turbulent electric and magnetic fields in the solar wind is crucial to identify mechanisms responsible for energy dissipation and plasma heating and is therefore one of the main objectives of the THOR mission. In preparation of these observations, we discuss Cluster measurements in Earth's magnetosheath investigating the transition of plasma turbulence from fluid to kinetic scales and presenting simultaneous magnetic and electric spectra for the first time. While the two fields have approximately similar behavior in the fluid-MHD regime, they show different trends beyond ion scales. As the magnetic field spectrum steepens in sub-ion range, the electric field spectrum is characterized by a shallower power law reaching electron scales, in agreement with theoretical expectations. In situ observations are compared with 2-D and 3-D high-resolution kinetic (hybrid) numerical simulations and discussed in the framework of the current modeling of collisionless plasma turbulence. In the next future it will be possible to test and confirm the good agreement between magnetospheric data and simulations also in interplanetary space thanks to forthcoming missions like Solar Orbiter and Solar Probe Plus.